



AOC LSI Industry Days 18-20 November 03

Col Terry Szanto and Lt Col Greg
Gecowets

18 Nov 03



Purpose of Industry Day

- Update Industry
- Feedback from Industry
 - SOO and AMS
 - Questions posted to HERBB



Today's Agenda

| | |
|-------------|--|
| 0800 - 0805 | Introduction & Admin |
| 0805 - 0845 | Program Status Update |
| 0845 - 0855 | AFC2ISRC Rqmts and POM Status |
| 0855 - 0915 | Schedule and Site Visit |
| 0915 - 0935 | OCI and CLIN Structure |
| 0935 - 0945 | Break |
| 0945 - 1000 | SOO Comments |
| 1000 - 1015 | Responses to submitted questions |
| 1015 - 1045 | Complex Adaptive Systems Engineering (NECSI head) |
| 1045 - 1200 | Lunch |
| 1200 - 1605 | One on One Sessions |



One on One Sessions **for today only**

Tues 18 Nov (3M-135)

- | | |
|----------------|---------|
| 1. 1200 – 1315 | General |
| Dynamics | |
| 2. 1325 – 1440 | L-3 |
| 3. 1450 – 1605 | Titan |



Program Status Update

Col Terry Szanto

18 Nov 03



AOC WS

Lead System Integrator

- Why an LSI?
 - Increased systems engineering rigor
 - Continuity of operations
 - Bring in commercial best practices
 - Manpower to do the job right/flex for contingencies
 - Future SPO manpower reductions require an LSI start NLT FY06
- Lead integrator, not a developer
 - System of Systems perspective
 - Guide AOC applications, services and infrastructure towards overarching architecture
 - Move AOC Modernization to Net Centric Operations
 - Standardize fielding and sustaining

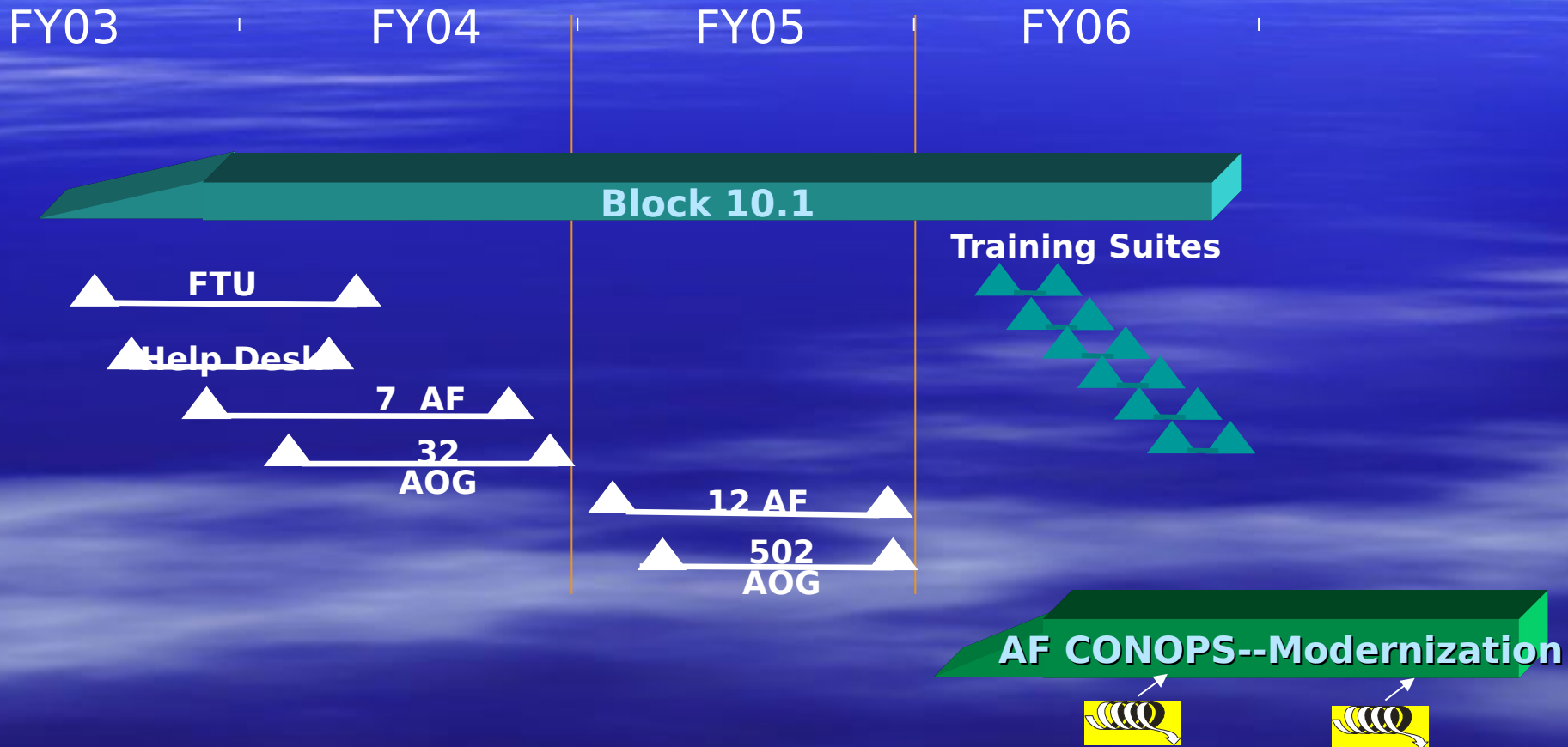


LSI Competition Status

- Scope of Work not aligned with 05 APOM
 - Reqmts/Cost Trade Study outbriefed to Air Staff principals on 30 Oct
 - The scope of work is driving the bill, not the existence of an LSI
 - Draft inputs to Acquisition Decision Memorandum forwarded to Air Staff on 3 Nov 03
 - Awaiting direction
 - LSI is the right thing to do, however:
 - Fiscal realities may require delaying the start, and/or phasing in fielding, sustainment, & modernization
 - Solicit Industry Feedback on feasibility of FY05 start
- Compete once, time phase the work effort**



Near Term Program Schedule





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Falconer Installations with FY 05 LSI Start

FY 04

FY 05

FY 06

7th AF Install

Site Survey

32nd AOG Install

Site Survey

Site Survey

Contract Award

Transition Complete

90 Day X-tion Period

12th AF Install

502nd AOG Install

90 Day X-tion Period

Discussion Topic

Labor \$

Govt Labor
(Govt/FFRDC/ITSP)

LSI Labor

Follow-on effort
dependent on content

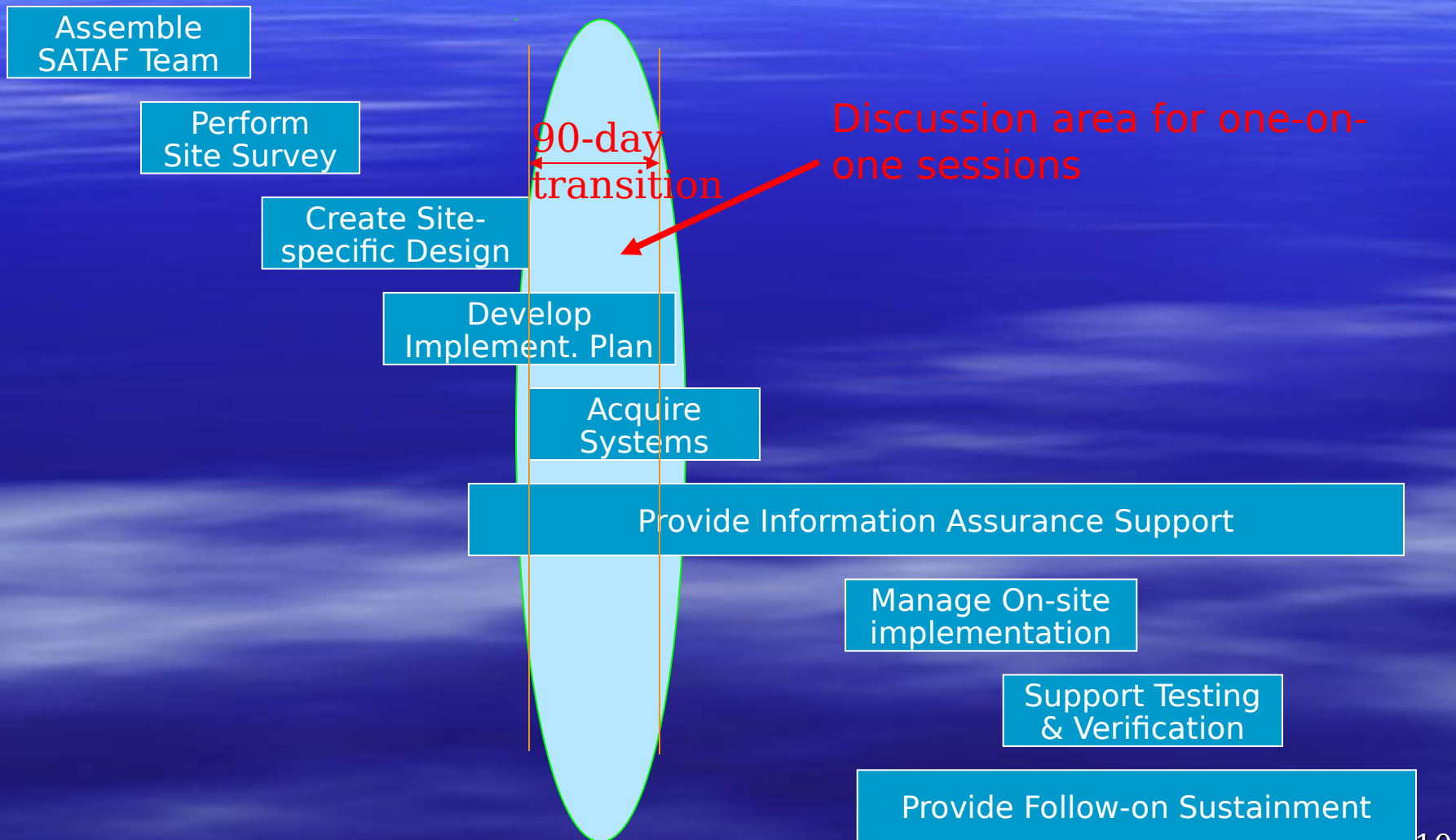


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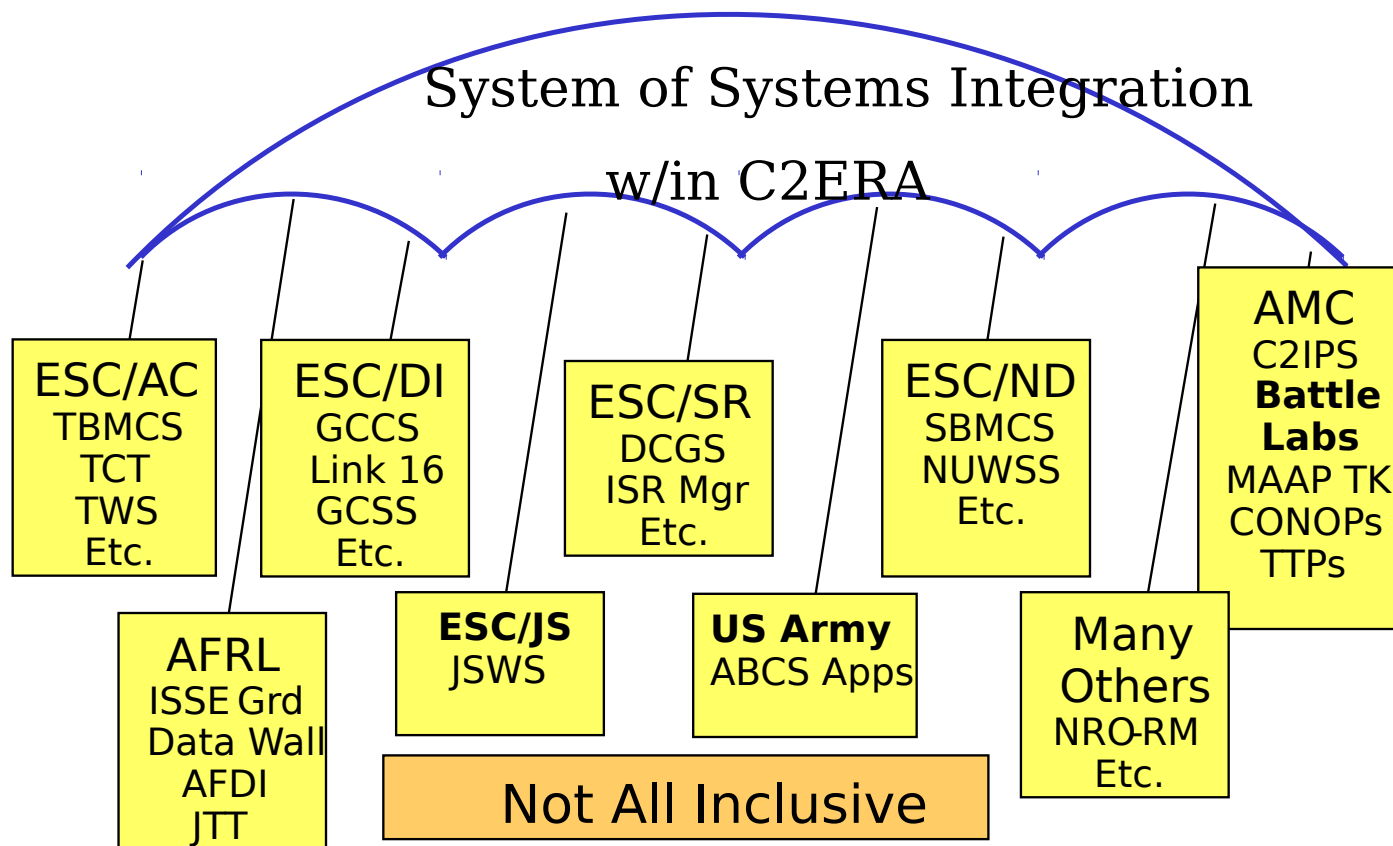


SATAF Fielding Process Flow

Notional ~15 month process



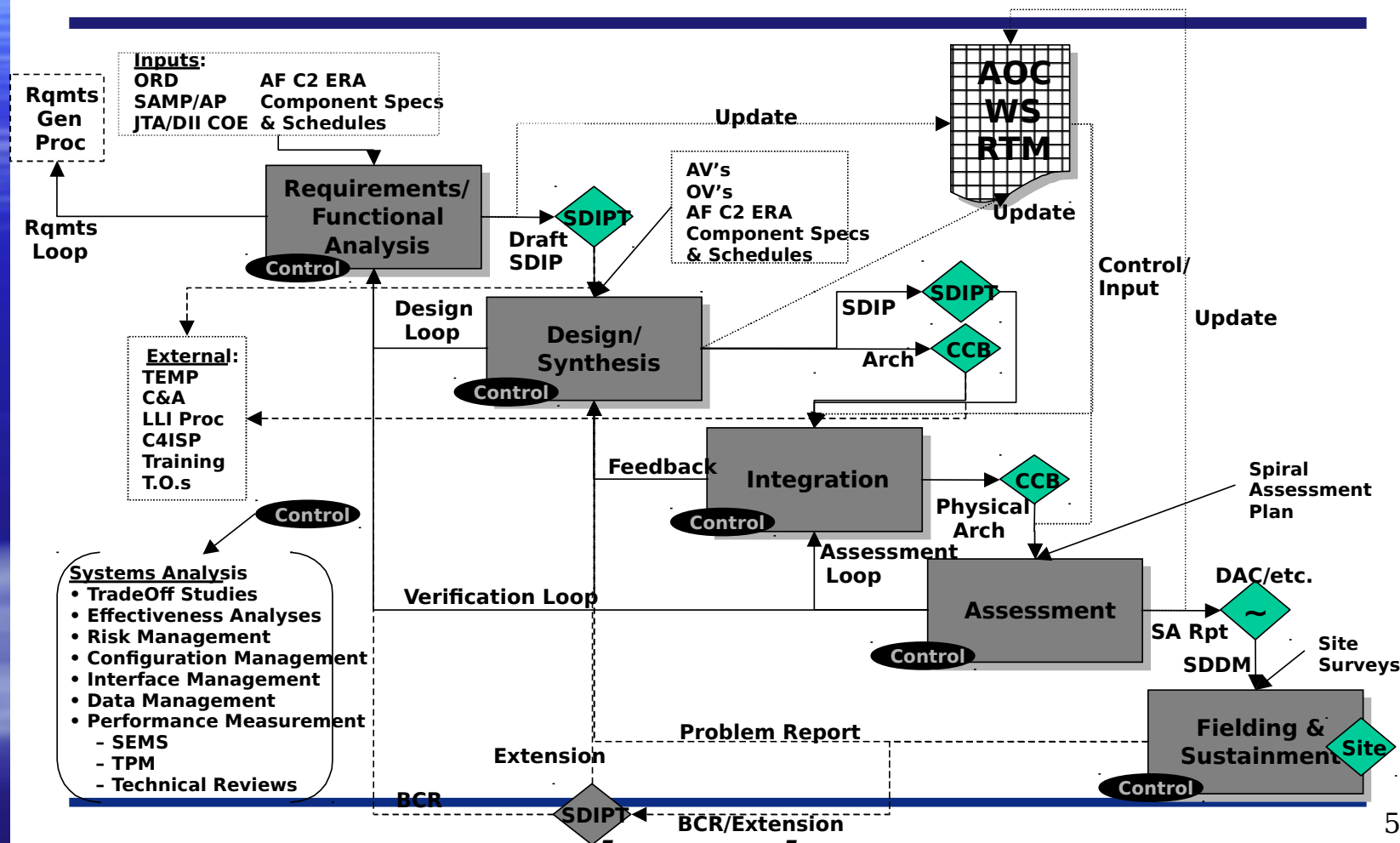
Orchestration & Integration





Systems Engineering Process

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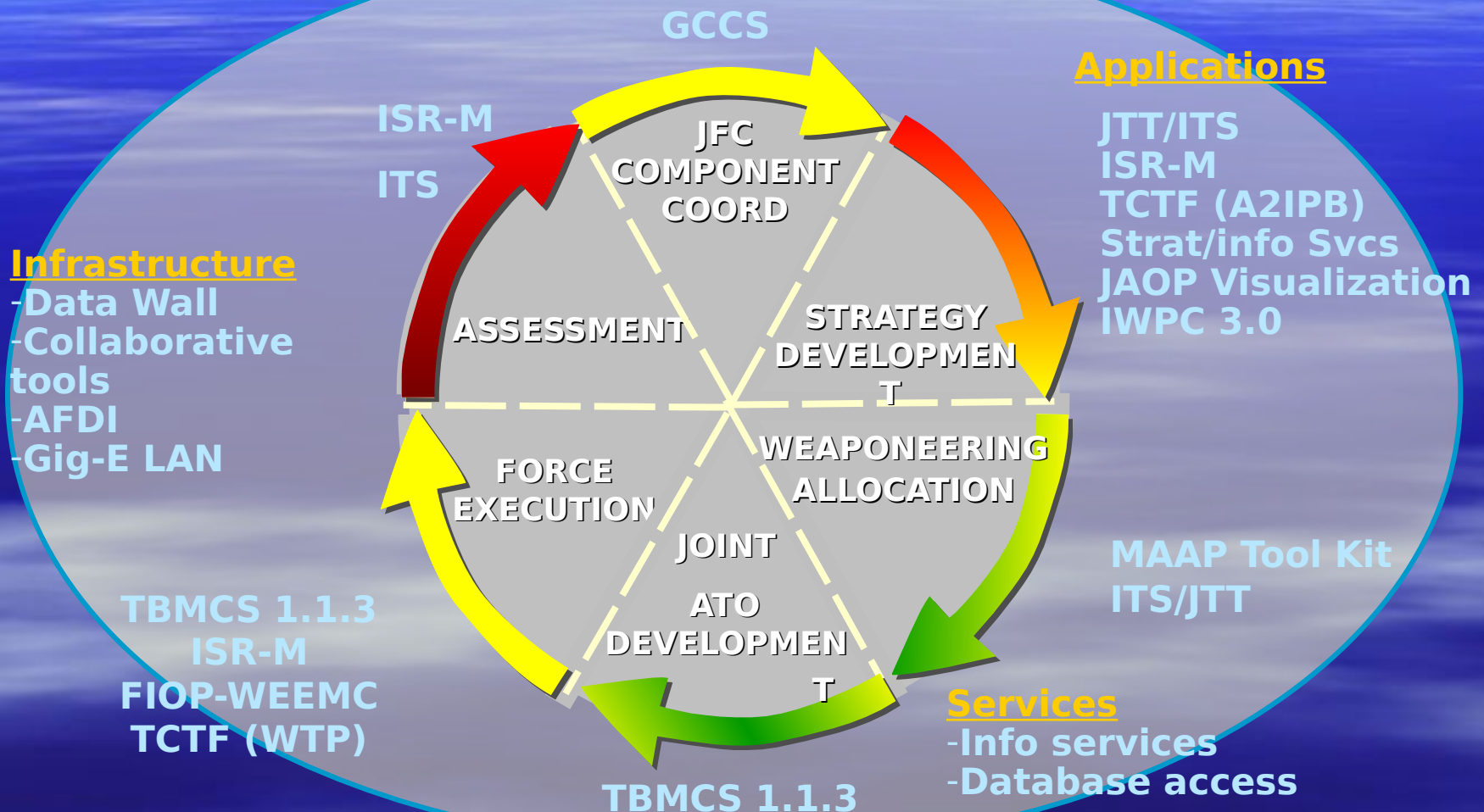




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Block 10.1 Near Term "System" Enhancements





Block 10.1 Objective

ESC - Managed Systems in Orange Italics



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Mission Applications

1. Collection Management Mission Application (Navy)
2. Command and Control Information Processing System (AMC)
3. Command and Control Personal Computer (USMC)
4. Generic Area Limitation Environment Lite (NRO)
5. *Global Command and Control System (ESC/DI)*
6. Global Decision Support System (AMC)
7. Global Transportation Network (TRANSCOM)
8. Imagery Product Library (NIMA)
9. *Information Warfare Planning Capability (ESC/SR)*
10. Interim Targeting Solution (AFRL)
11. Joint Deployable Intelligence Support System (NMIC)
12. *Operational Model Exploiting GPS Accuracy (ESC/NDC)*
13. *PC Integrated Intelligence and Imagery (ESC/ACJ)*
14. Planning and Decision Aid System (NSA)
15. Personnel Recovery Mission Software (JPRA)
16. *Portable Flight Planning System (ESC/ACU)*
17. RAINDROP (COTS)
18. Requirement Management System (DIA)
19. *Space Battle Management Core System (ESC/NDC)*
20. *Theater Battle Management Core System (ESC/ACF)*
21. *Theater Weather Server (ESC/ACW)*
22. *Worldwide Origin Threat System (ESC/NDC)*
23. Weapons System Video (AF/SCM)
24. Combat Survivor/Evader Locator (SMC/CZJ)
25. *Intelligence Surveillance Reconnaissance Manager (ESC/SR)*
26. *Time Critical Targeting - F (ESC/ACF)*
27. All Source Satellite Evaluation Tool (NRO)
28. *Commanders Tactical Terminal (ESC/SR)*
29. Generic Area Limitation Environment (NRO)
30. *Global Command and Control System - I3 (ESC/DI)*
31. Powerscene (n/a)

Services

32. Air Operations Net (n/a)
33. Broadsword (AFRL)
34. *Defense Message System (SSG)*
35. *Global Broadcast System (ESC/MC)*
36. INTELINK and INTELINK-S (n/a)
37. Joint Collaboration Environment (COTS)
38. NSA Threat Warning Net (n/a)
39. *Predator Video (ESC/SRG)*

41. *Testbed Data Information Exchange System-Broadcast (ESC/SR)*
42. *Tactical Intelligence Broadcast System (ESC/SR)**
43. *Tactical Related Applications (ESC/SR)**
44. CSP AUTODIN
45. Internet Relay Chat (COTS)
46. *Combat Track II (ESC/SRK)*
47. Hummingbird Exceed (COTS)
48. JWARN (USMC SC)
49. Global Hawk Access (ASC/RAV)
50. Geospatial Product Library (Eagle Express) (NIMA)
51. *Multi-Media Message Manager (M3 AMHS) (ESC/SR)*
52. Outlook Web Access (OWA) (COTS)
53. Sky Media
- Infrastructure**
54. Data wall (n/a)
55. Domain Core (n/a)
56. *Perimeter Security System (ESC/ACF)*
57. *JICO Support System (ESC/ACF)*
58. Radiant Mercury (ARFL)
59. Imagery Support Server Environment Guard (ARFL)
60. Community of Interest Network (n/a)
61. C2 Weapon System Part Task Trainer (AFC2TIG)
62. Joint Worldwide Intelligence Communications System (n/a)
63. Sensitive but Unclassified Internet Protocol Network (n/a)
64. Secure Internet Protocol Router Network (n/a)
65. Tactical Data Links in formats A, B, J (n/a)
66. *Air Defense System Integrator - TSQ-214 (ESC/DI)*
67. *Deployable Transit-case System (ESC/SRG)*
68. Joint Tactical Air Ground System (Army)
69. Precision Lightweight Global Position Receiver (n/a)
70. *Tactical Data Processing Suite (ESC/SR)**
71. *Tactical Data Terminal (ESC/SR)**
72. *Tactical Receive Suite (ESC/SR)**
73. Air Force DoDIIS Infrastructure (aka JEDI) (AFRL)
74. AOC Security Portal (n/a)
75. Access Net
76. CENTRIX-S (n/a)
77. Gigabyte Ethernet (n/a)
78. GPS Timing (n/a)
79. Network Appliance Filer System (NAS) (n/a)
80. STAMPS
81. Multi-Level Security (n/a)



AOC WS Modernization— AF/GS CONOPS Operational Capabilities Required



Block 10.2 (06-08)

- Strategy and Assessment
- Airspace Management (Deconfliction)
- Information Management
- PBA for Air & Space Operations Planning
- Improved Coalition Interoperability

Block 10.3 (08-09)

- Enhanced Airspace Deconfliction
- Full Spectrum ISR Management
- Information Mgmt
- Multi-Level Security
- Improved Point Mensuration
- Distributed Mission Operations
- Modeling & Simulation

Block 10.4 (10-11)

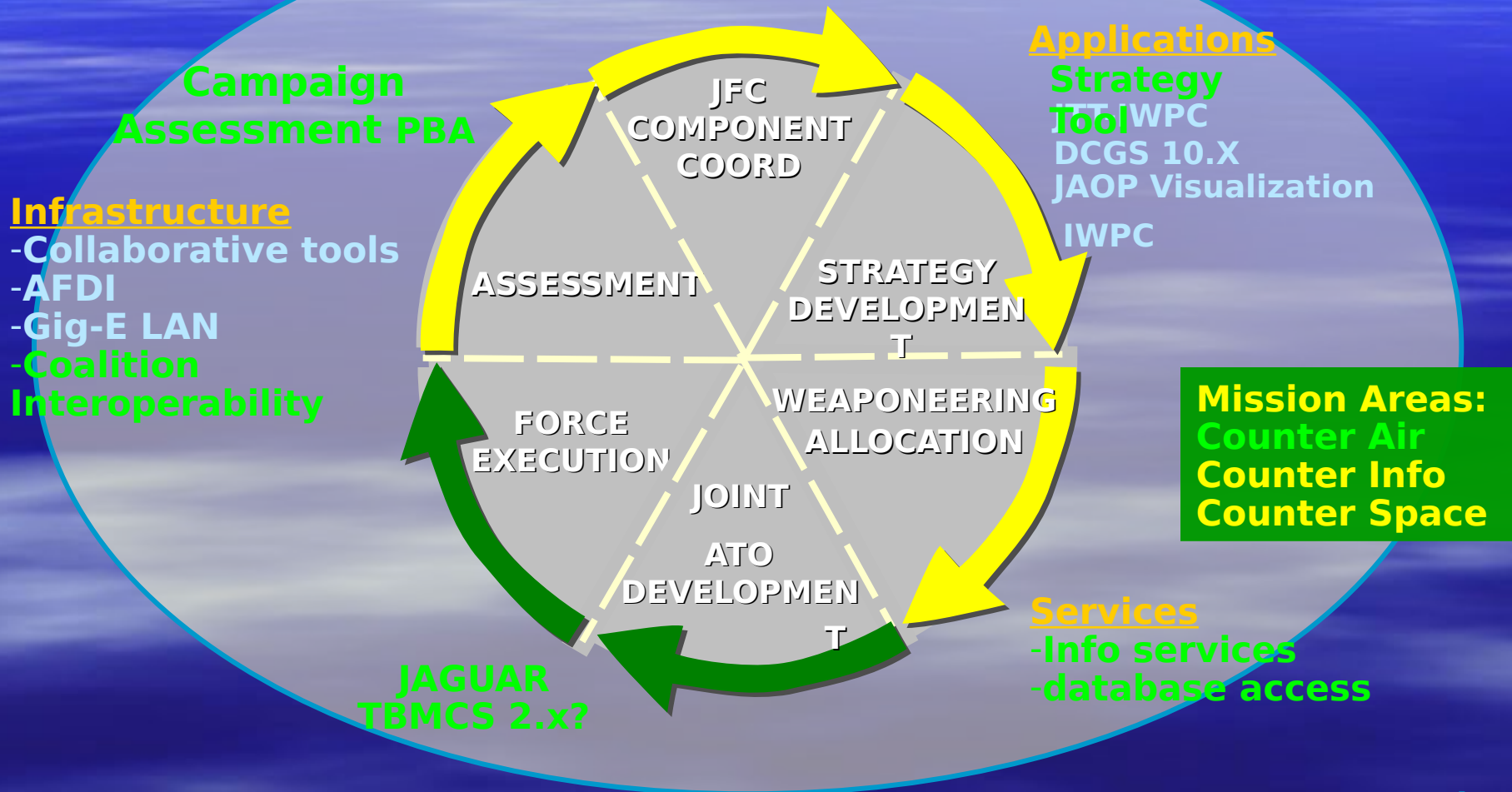
- Rapid Deployability
- Network Centric Architecture
- Fusion
- Effects Based Operations
- High-Resolution Visualization
- Smart Agent Technology
- Target Recognition of TSTs



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Block 10.2 Mid Term "System" Enhancements

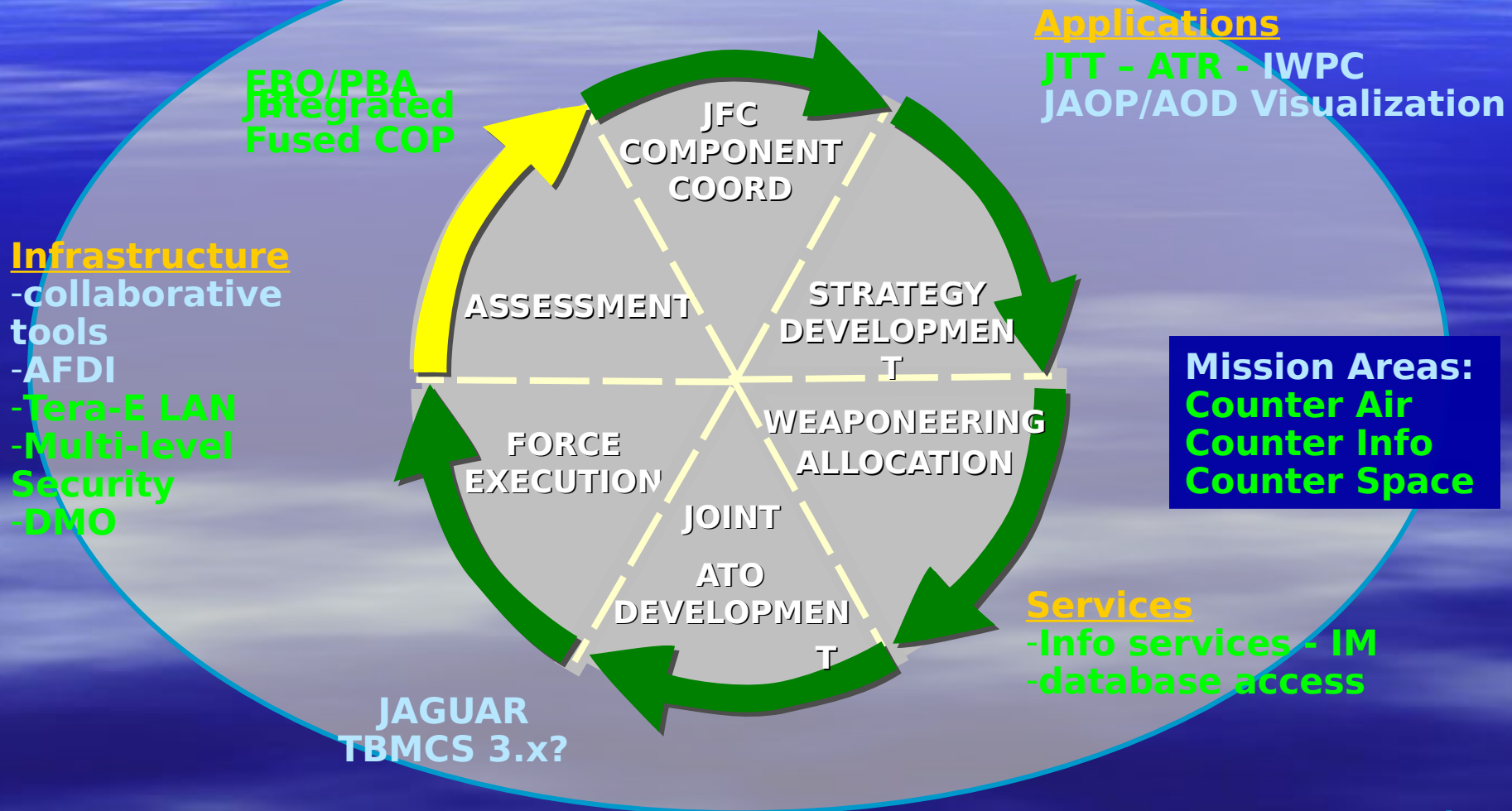




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Block 10.3/4 Far Term "System" Enhancements

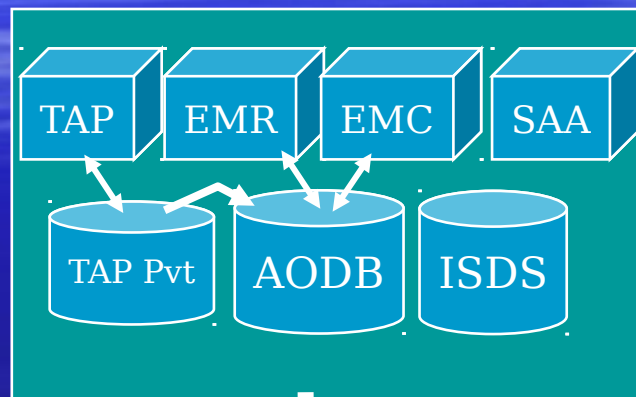




From AOC Platform to Net-centric Air Battle Operations



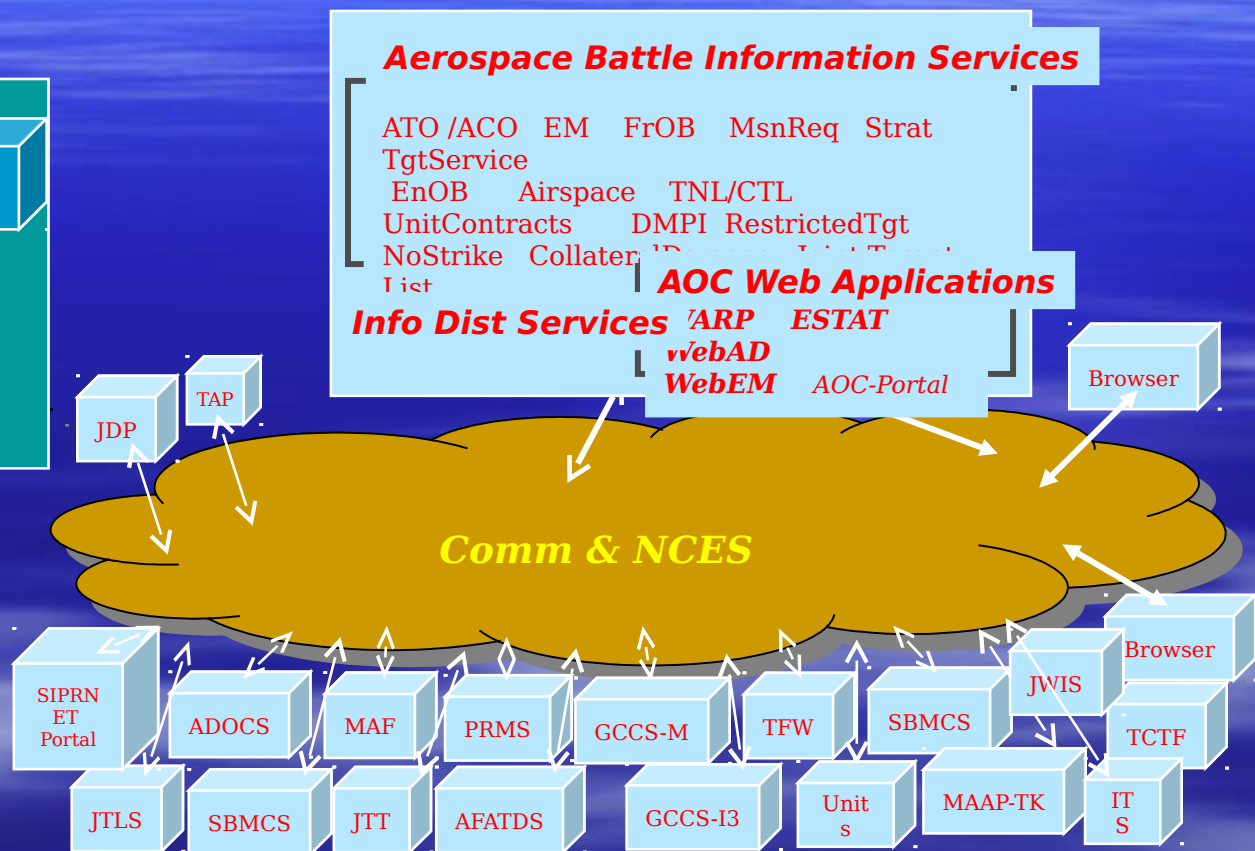
Platform Centric



USMTF

- Point-to-point
- System-to-system
- Defined flow
- Tight-coupling

Netcentric



- Network-wide availability
- Multiple concurrent flows supported
- Loose-coupling - no *a priori* defined flow



Summary

- **AOC will bring on an LSI**
 - Questions on timing, and phasing
 - We'll not keep Industry hanging
- **There are lots of details to work, regardless of the final decision**
 - We'll adjust the competition schedule accordingly
- **Look forward to continuing the dialogue with Industry**



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Updates to Requirements and Funding

Lt Col Greg Gecowets
AFC2ISRC



AFC2ISRC Perspective



- Requirements-driven effort
- Resource-constrained environment
- Partner with industry to help warfighters



Requirements Driven



- Big “Rs”
 - Revised AOC ORD, dated 16 Oct 03
 - C2 GOSG direction remains “standardize, train, then modernize”
- Little “rs”
 - Expanded C2 Requirements Identification Database (C2RID)
 - AFC2ISRC manages, MAJCOM and Joint partners provide input, votes
 - AF retains executive agency



Resource-constrained Environment



- FY04-05 funding tight, more bills coming
- FY06 POM—much competition
- Integration effort key
 - Better ways of using what we've got
 - Develop strategies to leverage other programs
 - Balance related programs to close seams and eliminate overlap



Partner with Industry

- Given constraints, we need to take a fresh look at managing the system
- Find innovative ways to get from “as-is” to “to-be”
- Develop better/clearer understanding of what we need and what you can offer



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AOC LSI Schedule

Maj Joe Nedean

18 Nov 03



Notional Schedule

- Industry Day #1 8 – 9 Sep 03
- **Industry Day #2** **18 – 20 Nov 03**
- **AOC Site Visit** **13 – 15 Jan 04**
(CAOC-X)
- **Publish SSS #2** **28 Jan 04**
(Advisory Multi-Step Process)
- **ASP** **02 Mar 04**
- **Post Draft RFP** **19 Mar 04**
- **Industry Day #3** **13 – 15 Apr 04**
(Section L & M working session)
- **Release RFP** **14 May 04**
- **Receive Proposals** **25 Jun 04**
- **Contract Award** **17 Nov 04**



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AOC WS LSI

Advisory Multi-Step Process

- Release SSS #2 28 Jan 04
- Receive White Paper responses 20 Feb 04
- Complete White Paper Evaluation 15 Mar 04
- Issue Questions 17 Mar 04
- Receive Responses 24 Mar 04
- Assess Responses 25–26 Mar 04
- Debrief “Offerors” 29
Mar– 2 Apr 04



Industry Visit to Transformation Center

Mr Joe May

18 Nov 03



Industry Visit to Transformation Center

- Issue: Industry needs more insight into AOC operations and issues to help them develop their LSI proposals
- Game Plan: AOC SPO/AFC2TC host Industry teams competing as primes for AOC LSI award

Date: 13-15 Jan 2004

Location: CAOC-X, Bldg 15 (480th Intel Group),
34 Elm Street, Langley AFB, VA

OPR: ESC/AC OL-L (J. May)

OCR: AFC2TC (Col Keller)



Proposed Agenda

- Overview – ESC/AC-OL-L
- CONOPs – AFC2ISRC/DO
- Requirements – AFC2ISRC/DO
 - Falconers
 - Functionals
 - Training/Innovation
- Standardization/Sustainment Approach
 - ESC/AC-OL-L
- Modernization Approach – ESC/AC-OL-L



Proposed Agenda Cont'd

- Processes and Applications – AFC2TC/AFC2ISRC/DO
 - Strategy Division –
 - Combat Plans Division –
 - ISR Division –
 - Combat Ops Division –
 - Air Mobility Division –
- Block 10.1 Baseline – ESC/AC-OL-L
 - Applications
 - Services
 - Infrastructure



Proposed Agenda Cont'd

- Current Configuration Control Processes
 - AOC IPT, CCB, EADR, GOSG etc
- Government Lessons Learned
 - ADOCS
 - NCES
 - AUAB



OCI and Proposed CLIN Structure

Capt Brian Heaps
18 Nov 03



Organizational Conflict of Interest - Defined

An Organizational Conflict of Interest (OCI) may result when factors create an **actual or potential** conflict of interest on a contract, or when the nature of the work to be performed on the ***contract creates an actual or potential conflict of interest on a future acquisition***. In the latter case, some restrictions on future activities of the contractor may be required (FAR 9.5).



OCI



What's your part?

- Assess your company's role in the AOC
- 2 Govt. concerns regarding OCI on AOC
 - Support contractor
 - System supplier within AOC
- Goal is to
 - Eliminate any actual or potential OCI
 - Mitigate any perceived OCI



OCI Process

- Submit an OCI Mitigation Plan to PCO
- 3 major elements to address
 - Identify any contracts that may have OCI issues
 - Discuss why you believe actual/potential OCI exists
 - Mitigation strategy for each contract
- Mitigation strategies may include
 - Firewalls, geographical separation...
 - Must specifically address the “how” aspect
- Be AOC LSI focused



OCI Timeline

- Submit your OCI plan NLT 15 days prior to release of SSS #2 (AMS)
 - Current schedule is 9 Jan 04
- Govt will review your plan and provide feedback...PCO approves your OCI Mitigation Plan
- THE EARLIER THE BETTER!



Proposed CLIN Structure

- **0001 Fielding**
 - 000101 Falconers
 - 000102 Training & Innovation AOCs
 - 000103 Functional AOCs
 - 000104 Augmentation Units (Reservists)
- **0002 Sustainment**
 - 000201 Falconers
 - 000202 Training & Innovation AOCs
 - 000203 Functional AOCs
 - 000204 Augmentation Units (Reservists)
- **0003 Modernization (field baseline updates)**
 - 000301 Falconers
 - 000302 Training & Innovation AOCs
 - 000303 Functional AOCs
 - 000304 Augmentation Units (Reservists)
- **0004 Integration and Management**
 - 000401 Falconers
 - 000402 Training & Innovation AOCs
 - 000403 Functional AOCs
 - 000404 Augmentation Units (Reservists)
- **0005 Training**
- **0006 Award Fee**
- **0007 ODCs/ODMs**
- **0008 Studies**
- **0009 Help Desk**



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Break



Today's Agenda

| | |
|-------------|---|
| 0930 - 0950 | SOO Comments |
| 0950 - 1010 | Responses to submitted questions |
| 1010 - 1045 | Complex Adaptive Systems Engineering (NECSI head) |
| 1045 - 1200 | Lunch |
| 1200 - 1605 | One on One Sessions |



Statement of Objectives (SOO) Comments

Capt Melissa Wilson

18 Nov 03



S00



- Posted the draft S00 – 28 Oct 03
- Requested Contractor Feedback
 - Received 10 companies comments back



SOO Comments Requirements

- Request for clearer definition of roles and responsibilities for future LSI
- Request a definite list of government tasks vs. LSI tasks



SOO Comments Business Processes

- Define the cost reporting management system to be used
- Define type of contract
- Provide draft requirements and affordability profiles



SOO Comments Technical



- Will there be any directed open architectures standards?
- Define how technical decisions will be made and how business decisions will be implemented
- Will LSI be required to develop organic software for integration? If not who will?



Responses to Submitted Questions

1Lt Justin Johnson
18 Nov 03



Q & A Document

- Compilation of all questions posed to government since Industry Day #1 (8-9 Sept)
 - Living document—Continue to route all questions through AOC WS LSI PCO, Capt Brian Heaps
 - Updates will be routinely posted to HERBB—Initial posting to occur by COB 21 Nov 03
- Questions broken into the following categories:
 - Acquisition Strategy
 - Technical
 - General
 - Operational
 - Organizational Conflict of Interest (OCI)
 - ❖ Additional categories will be added as necessary
- Government has answered all questions it is capable of answering to this point



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Complexity

Dr Bar-Yam



Engineering Complex



Systems:

Multiscale Analysis

and

Evolutionary

Engineering

Yaneer Bar-Yam
New England
Complex Systems
Institute

Understanding Complex Systems

- Analysis:
 - Multiscale Analysis of Patterns and Interdependence
 - Why planning and decomposition don't work
- Synthesis:
 - Evolutionary Engineering Learning by doing, Planning by fostering
 - Designing environment for evolution



Outline

- Part I: Analysis
 - Decomposition
 - Phenomenology
 - Implications
- Part II: Synthesis
 - Evolution
 - Examples
 - AOC LSI

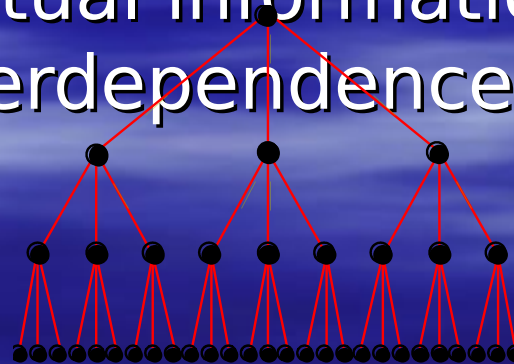


Conventional Systems Engineering

- 1. Specification by decomposition
 - (Modularity, hierarchy, abstraction, layers)
- 2. Implementation
- 3. Fielding

Multiscale Analysis of Decomposition

- Bound on effectiveness due to interdependence
- Coordination (interfaces) become impractical
- Interfaces dominate system design
- Analysis: Mutual information at different scales of interdependence



Information in interfaces

- The amount of information in the interfaces can greatly exceed the amount of information in any one component.
- This means that for interdependent systems, the interfaces become much more difficult to design than the components.
- The whole point of decomposition is to create manageable parts ⇒ Failure of strategy!



... also time:

- Time to implement is longer than
 - time of change of needs
 - time of change of technology
 - ...



Phenomenology

- Engineering project failures
- Studies of engineering failures
- Centrally planned economies



Large engineering projects (Saltzer)

- Vehicle registration, Drivers license-California Dept. of Motor Vehicles
 - 1987-1994 (scrapped), \$44M
- Automated reservations, ticketing, flight scheduling, fuel delivery, kitchens and general administration - United Air
 - Late 1960s-Early 1970s (scrapped), \$50M
- State wide Automated Child Support System (SACSS) - California
 - 1991-1997 (scrapped), cost: \$110M



Large engineering projects

(Saltzer)

- Hotel reservations and flights - Hilton, Marriott, Budget, American Airlines
 - 1988-1992 (scrapped), \$125M
- Advanced Logistics System - Air Force
 - 1968-1975 (scrapped), \$250M
- Taurus Share trading system - British Stock Exchange
 - 1990-1993 (scrapped), \$100-\$600M



Large engineering projects

(Saltzer)

- IBM Workplace OS for PPC
 - 1991-1996 (scrapped), ~\$2B
- IRS Tax Systems Modernization
 - 1989-1997 (scrapped), \$4B
- FAA Advanced Automation System
 - 1982-1994 (scrapped), \$3-\$6B
- London Ambulance Service
 - 1991-1992 (scrapped), \$2.5M, 20 lives



1995 Standish Group Study

- 20% - Success:
 - On time, on budget, on function
- 50% - Challenged:
 - Over budget (x2), Over schedule (x2)
 - Missing function (x2/3)
- 30% - Impaired:
 - Scrapped



Driving force for planning:

- Assurance/Certainty:
 - If we know what we want, if we plan it
 - ... then we will get what we want.
- Efficiency:
 - No waste by duplication of effort.



Example: Soviet Union

- Consider Food Supply and centralized (scientific) planning:
 - Each enterprise has specification of input and output for each product.
 - Plan each year.
 - Plan includes details of supplies, products, labor, prices. What arrives / leaves and where it arrives from / goes to.



Reasoning:

- Soviet planners believed free market was wasteful: Duplication of effort. Lack of planning means lack of assurance. Lack of certainty in outcomes.
- Planning should give efficiency and effectiveness.



Outcome

- How many types of food: 100
 - Salt, pepper, a few meats, a few breads, potatoes, beets, ...
- Availability poor: Supply limited
 - People wait in lines, look for food that they want
- Spoilage, quality very low
 - Fresh fruit rot in warehouses even though not available. Beer and milk is watered down ...



Consequence of planning:

- Assurance/Certainty of design:
 - Ensures inability to create an effective system in the context of uncertain environment.
 - Ensures inability to change in the face of changing demands
 - Ensures inability to utilize innovation and discovery in the project.
 - Ensures inability to utilize innovation from outside the project.



Implications of analysis

- Too complex projects --- Don't plan
- Now what?
- Reduce complexity if you can.
- Otherwise --- use evolution.
 - Not just incremental change



Evolutionary Engineering

- Multiple parallel implemented components competing in performing actual tasks.



Disclaimer

- Not a prescription for AOC LSI
- I represent the
- New England Complex Systems Institute
 - Research and Education in Complex Systems.
- Discuss features that are relevant to an approach to evolutionary engineering.



Creating an environment

- The central concept is to design an **environment** for system creation rather than a system directly.
- The system will be created as a whole by ongoing changes in parts. The parts will not be planned together, neither will their interfaces or interactions.



Environment Design

- • Focus on creating an environment and process rather than a product.
- • Continually build on what already exists.
- • Operational components are modifiable in situ.
- • Operational systems include multiple versions of functional components.
- • Utilize multiple parallel development processes.



Environment Design (cont.)

- • Evaluate experimentally in-situ.
- • Increase utilization of more effective components, gradually.
- • Assume that effective solutions to specific problems cannot be anticipated.
- • Traditional system engineering should be used for not-too-complex components.



The Environment Provides:

- • A process of evaluation
- • A mechanism of reward
- • Safety constraints
- • Rules for cooperation and competition



Need to develop

- On-line environment for continual change.
- Off-line environment for preparation.
- Context in which others may participate in competition / component development.



Examples

- Open Source Movement
- NASDAQ
- VISA International



References

- [1] Y. Bar-Yam and M. L. Kuras, Complex Systems and Evolutionary Engineering, AOC Concept Paper, HERBB (2003)
- [2] Y. Bar-Yam, Enlightened Evolutionary Engineering / Implementation of Innovation in FORCEnet, Report to Chief of Naval Operations Strategic Studies Group, 2002 (Brief 2000).
- [3] Y. Bar-Yam, Dynamics of Complex Systems (Perseus Press, 1997).
- <http://necsi.org>

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Summary

- Complex systems theory and extensive experience demonstrate that sufficiently complex systems are not accessible to decomposition and abstraction strategies.
- When mission needs cannot be served by simpler systems, evolutionary engineering strategies incorporating multiple parallel and diverse field testable components are necessary.

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One on One Sessions



Wed 19 Nov (1M-513)

- 4. 0845 – 1000 Boeing
- 5. 1010 – 1125 Lockheed Martin
- 6. 1135 – 1250 Thales Raytheon
- 7. 1320 – 1435
- 8. 1445 – 1600 Booz Allen Hamilton

Thurs 20 Nov (3M-135)

- 9. 0800 – 0915 BAE
- 10. 0925 – 1040 Northrop Grumman
- 11. 1050 – 1205 SAIC
- 12. 1235 – 1350 Accenture